CONTRIBUTIONS TO THE HISTORY OF THE COMMANDER ISLANDS.

NO. 1.—NOTES ON THE NATURAL HISTORY, INCLUDING DESCRIPTIONS OF NEW CETACEANS.

By LEONHARD STEJNEGER.

Prof. SPENCER F. BAIRD,
Secretary Smithsonian Institution,
Director U. S. National Museum:

DEAR SIR: As announced in my letter from San Francisco, the steamer "Alexander" started on the 5th of April at noon. The wind was very unfavorable, most of the time blowing from the west, and very often with a force of 40 miles an hour or more. Up to the 24th my observations show twice only a direction of wind from a different quarter. As we were compelled to make about *one thousand* miles under sail, our progress was necessarily slow, so that on the 23d of April we found ourselves only in longitude 145° west, and latitude 50° 35′ north, about 500 miles southwest from Sitka, and as many miles southeast from Kodiak. On the 30th of April we passed the Aleutian chain between Seguam and Amlia, in fog and sleet, and Bering Sea received us with a veritable hurricane from the east-northeast. After having stopped at the village of Copper Island the anchor was dropped in the morning of the 7th of May at Gavan, the harbor of Bering Island, where I landed with as much of my baggage as could be taken on shore before the cargo had been discharged in Petropaulski. Ere long I was comfortably lodged and began my work.

At first I was much confined to my station on account of the meteorological observations. Not until the obliging agent of the Alaska Commercial Company, Mr. G. Chernick, had been instructed how to take and record these observations, could I think of making longer excursions. Many thanks are due to him for his kind assistance. Thus I was unable to cross the northern part of the island, consisting chiefly of flat swamps and tundras, of lakes, a moderately high plateau, and a chain of interesting table mountains of about the same height, while the southern, mountainous and larger, two-thirds of the island remained a complete *terra incognita* to me. I therefore planned an expedition with the purpose of exploring the secrets of this region, the more as it was especially there that Steller had made his observations. But I had to wait until the sealing season was over, for all hands now were occupied in this, their chief, and one may safely say, only work.

Meanwhile I resolved to go to Petropaulski on the 16th of June to establish a meteorological station, and to hire and train an observer. Besides, it was my desire to study as much of the natural history of Kamtschatka as the surroundings and the limited time would permit.

The season was unfavorable, as the vegetation was already so luxuriant as to make it difficult to move outside of the roads, and the mosquitos were plentiful enough to make it extremely painful to lay in wait for birds or to creep around searching for spiders, beetles, and snails. However, if the stay was not very profitable to the collection, it was not entirely without results, for I gained a great deal of valuable experience which will be of use to me during my proposed visit to Kamtschatka next year. What rendered my sojourn there especially attractive and instructive was the daily intercourse with the experienced and meritorious explorer of Eastern Asia, Dr. Benedict Dybowski, who, of course, better than any one else, could give me all desirable information. On the 15th of July I found myself again on Bering Island.

The following weeks were occupied chiefly by observations on the rookery, about 15 miles distant from the village, and I could not begin to think about the expedition towards the south before the middle of August.

Every one suggested that the most practicable way would be to go around the island in a boat, as traveling overland with dogs would be difficult and expensive, and, on the other hand, several places of interest would be inaccessible by this route, which, besides, would offer little or no opportunity for carrying the necessary outfit and the objects of natural history I might possibly collect during the journey. The prospect of finding a skeleton of a sea-cow at any one of these places, seldom or never visited by the natives, was a very probable one, and as such a skeleton alone would be enough to load a boat even larger than ours, I resolved to hire six Aleuts, to man the boat of Mr. Grebnitzky, kindly placed at my disposal. Mr. Osche, in the service of the Alaska Company, who during a sojourn of several years had traversed the island in all directions on his hunting expeditions, and had thereby gained an extensive knowledge of the island and its products, joined the expedition as a volunteer; an assistance the more valuable, as without it I should hardly have been able to realize my intention.

The special object of the expedition was to study the general natural history of the southern part of the island, to collect specimens of all kinds, as far as circumstances would permit; but especially to search for remains of the sea-cow. I also proposed to survey the island for further explorations, and to collect material for a more correct and detailed map than the one in existence. Besides I wished to identify the places mentioned by Steller in his narrative, in order to compare his description with the localities as they present themselves to-day, and to restore the original names. I also desired to visit the spots where Bering's vessel was wrecked, where the ill-fated expedition wintered and where Steller made his observations on the sea-cow.

The "circumnavigation" took place between August 21 and the 1st of September. It was attended by all the disagreeable consequences of fog and rain, of wind and surf, and the few skins which could be

obtained under these circumstances were almost spoiled at our return. The personal inconveniences during a 12 days' journey on the ocean, along an open coast without harbors or anything like a shelter; of being kept wet by continuous fogs and rains; of sleeping under an old sail, are serious; but no naturalist would ever count them should the result of his work be in inverse proportion to his troubles.

Unfortunately, I cannot so report, because the animal life, contrary to my expectations, was much poorer with regard to species than in the northern part, although the number of individuals was considerably larger. In fact, the only addition to my list of birds observed on the island was a single species, *Rissa brevirostris* Brandt, a species strangely limited in its distribution on the island.

I inspected a large colony of *Rissa kotzebui* Bp., situated on the western shore, about 18 miles from Cape Manati, the southwestern point of the island, where thousands and thousands of this black-legged Kittiwake were now feeding their almost full-grown young ones. Among them a single red-legged bird, quite lonely, and apparently without any young, had placed itself on a narrow shelf of the rocky wall. It was the first and the only one I saw, and I was fortunate enough to shoot it. *R. kotzebui* was observed in countless numbers along the western shore; but as soon as we had doubled Cape Manati we met as large or still larger flocks of *R. brevirostris*, among which not a single black-legged individual could be detected. I minutely surveyed a breeding colony on this side, and the result was the same, not a single black-legged one was seen. And thus the red-legged form completely excluded the other along the eastern shore, except at Cape Tonkoj, where the coast trends towards the northwest. Here on the cape a larger flock of Kittiwakes was sitting on the shore so closely packed that only the legs of the outer row could be seen; they were all red. I shot, however, and of the ten lying on the ground, seven were red-legged, while three belonged to the black-legged species. The young of *Rissa brevirostris* also has dark legs, but I need not expressly state that I did not make any mistake in this respect.

On the other side of the last-mentioned cape the old acquaintance received us as exclusively as along the western shore. Thus, the genus *Rissa* occupies the whole shore-line of the island, of which *kotzebui*, however, has usurped nine-tenths, leaving to *brevirostris*, as an exclusive possession, but one-tenth, or about 12 miles.

We found, however, another animal, which I much regretted not to have been able to skin and to carry with me. But, as it was a *Balænoptera*, 50 feet long, I was compelled to leave it where it was found. I spent a day on the spot in order to take the necessary measurements, and to make such investigations as the far-advanced decomposition of the carcass would allow, as a matter of course. I need not state that while this business was to some extent a veritable pleasure to the naturalist, it was not agreeable at all to the civilized man. Further on I shall give some details of the examination.

But now as to the sea-cow. We found the remains of one, and I will here give an extract from my journal concerning this event.

August 27, 1882, *Cape Tolstoj*—Mr. Osche went out hunting, while I was occupied in searching for fossils. From the extreme point of the cape I took some bearings of the other capes visible from here, and was just looking over my collections of stones when Mr. Osche returned with the cheerful message that he had found what he thought to be a skeleton of a sea-cow. Immediately we seized the spades and set out for the place. Having removed some spades full of soil, I soon became convinced that his supposition was right, but at the same time it was evident that the skeleton was in such a bad state of preservation that it would hardly be of any use. It was situated in a sand-bank 12 feet high, about equally distant from the base and from the top of the shore, close to a rivulet, which here had cut its bed through the bank and carried away the whole caudal portion of the skeleton. The distance from the sea was 500 feet in a straight line, and the height above high tide not less than 10 to 12 feet. The head of the skeleton pointed towards the west. It was lying horizontally on the back, slightly bent towards the left; most of the bones were in their natural position. The top of the sand-bank was covered with thick sod, and both above and below the skeleton the bank consisted of moist and rather fine sand, of the same kind daily washed up on the beach and deposited in horizontal and alternating blue and brown layers, the latter color greatly predominating. The color of the sand near the bones was blackish, sometimes iridescent. In spite of the miserable condition of the bones, I finished the exhumation in order to ascertain whether all parts were in their proper place. This caused us much pain and labor, not only because the sand had to be removed from the very top, but especially because the fine particles of the upper and dry layers were whirled by the strong breeze into our eyes.

Altogether, fourteen dorsal vertebræ with their ribs, the cervical vertebræ, the skull and sternum, two scapulæ, two humeri, and one cubitus were dug out; the other cubitus could not be found, nor any trace of a metacarpal bone. While all the other parts were found *in situ*, the sternum was lying outside, close to the right extremity, while the left one, consisting of a scapula and humerus only, was placed within the throat, close to the spine.

As stated above, the bones were in a miserable state of preservation, being decomposed in a very high degree, and so brittle as to be incapable of bearing their own weight, falling into many pieces when lifted out, even with the greatest care. Even the ribs, which are so hard that they present the appearance of ivory, were entirely rotten. Some bones had the consistency of flesh, while other parts would glide away between the fingers like soft soap. All the bones were of a dark reddish-brown color.

The impossibility of securing anything of value under such circum-

stances is self-evident. I therefore selected only a few of the best preserved bones, namely, the first and seventh ribs of the right side, and the os occipitis, in order to show the state of preservation. They form No. 1601 of my catalogue.

We did not return, however, without having our boat trimmed with bones of *Rytina*, mostly ribs, from the same skeleton, and two skulls, one being very fragmentary.

Of plants I collected only those not met within the northern portion, which are only a few species. The topographical part of my work was more successful than the zoological.

I had the opportunity of mapping this part of the island and can give a tolerably correct representation of this, the most western link of the Aleutian chain. It differs considerably from the old charts, which show deep gulfs where the coast line is actually straight, and land where we gaily sailed our boat.

I also visited the place of Bering's death, and the winter quarters of the ill-fated party, and spent two days in digging and surveying. The ruins of the house were measured and described, but my intention of making a sketch-map and some landscape sketches of the surroundings, was completely frustrated by the never-ceasing rain. The remains found were very scanty; some small glass beads and plates of mica, probably for trading purposes; a few iron grape-shot, fragments of a brass plate with Russian armorial ensigns, bolts, and sheaves from the vessel, &c. I have kept these relics, as perhaps the National Museum will be interested in receiving the only remains of this expedition.

I omit further details here, for this letter is intended to contain zoological data only. Besides, I have no copy of Steller's journal; and, finally, because I propose to revisit the place in order to complete my observations and to take the sketches above mentioned.

I am unable to send you at present a full description of the islands, as my sojourn here has scarcely exceeded three months. The following pages will contain merely some disconnected sketches of those things I consider to be new or of special interest. You will see, besides, that they are, with a few exceptions, limited to the land fauna, as this, of course, has been the main object of my studies and observations. The collections of marine animals are as yet insignificant.

My stay here has as yet been too short, of course, to allow of exhaustive generalizations with regard to the zoological relations of the islands, the more as I have been able to identify with certainty only a small portion of the animals which I have collected. But I do not hesitate to state that the character of the land fauna is palæarctic, as it has been supposed to be. Such being the case, you will not find it surprising that the faunal character of the island agrees more or less with that of Kamtschatka.

Although I am not prepared at present to give the reasons for my hypothesis, I still should like to remark that several facts show that

the islands during the period previous to which they received their present fauna and flora were totally covered by the sea, and that since that time they have not been connected with the mainland on either side. From this it would follow that none of the species occurring here are true indigenes. They evidently immigrated, especially and more regularly from the west, from Asia, by means of prevailing winds, currents, and the driftwood carried by these, and more accidentally from the east, from America. That the inhabitants, more independent of those circumstances, likewise show nearer relationship to the Asiatic fauna is partly due to the shorter distance, this being only 100 miles from the nearest cape of Kamtschatka, Cape Kronotski (which by the Russian man-of-war Vestnik this year has been found to be situated 20 miles more to the westward than given in the charts), while the nearest island of the Aleutian chain, Attu, is twice as far off; and partly to the effort of the Asiatic fauna to extend beyond its own limits. It is a well-known fact that the Asiatic fauna is in a continuous and comparatively rapid motion towards the west, especially in northern Europe. But it seems to me that a similar movement takes place in the eastern part of Asia, only in an opposite direction, the proof of which I find in the not inconsiderable number of exclusively palæarctic forms in Alaska, especially among the birds. I here enumerate only *Cyanecula*, *Saxicola*, *Phyllopneuste*, *Pyrrhula*, *Parus obtectus*, Cab., etc.

It is true that the zoögeographical regions overlap each other near their borders, but it is a remarkable fact that America contributes but very little to the fauna. Thus it is probable that ere long we will detect still more Asiatic forms in Alaska, and that hereafter it will be necessary to register as residents such species which at present are known only as temporary or casual intruders.

The occurrence of species peculiar to the islands (and I have no doubt that the final revision of the material collected by me will make known several new ones) will not invalidate what I have stated above with regard to the want of indigenous animals and plants. Their origin is due merely to variability in connection with isolation and time.

As to the plants I shall be very brief, as I am not a botanist. I limit myself to the remark that I find the general character of the flora very much like that of the treeless regions of Northern Europe, the most discrepant features being the splendid *Rhododendrons* (*kamtschaticum* and *chrysanthum*) and the Saranna lily (*Fritillaria saranna*). Still closer, of course, is the resemblance to the plants of Kamtschatka, especially to those in greater altitudes. The plants of both islands are, I think, identical, but the manner of their immigration very likely has caused the occurrence of some species in one island which are absent in the other. Thus I have from Copper Island a small but very conspicuous *Viola* with yellow flowers (much resembling the yellow variety of *V. tricolor*), a plant which I found also in Petropaulski, but not here on Bering Island.

The islands are completely destitute of trees, unless one might be tempted to term so the shrubs of *Salix*, *Sorbus*, and *Betula*, from 6 to 8 feet high, some of which obtain a proportionally great thickness close to the ground. Thus, for instance, I have a section of a birch with a diameter of 2 inches.

The vegetation, especially in the valleys, is very luxuriant, in most places of a man's height or more. This exuberance is especially due to the rich soil in connection with the extreme moisture, for the temperature during the three months, during which the plants have now been growing, was not high. My observations show a mean of +42°.7 F. for June, 48°.2 for July, and 54° for August. The minimum temperatures for the same months are 31°.3, 39°.4, and 44°.6, respectively. In higher latitudes the length of the day and the intensity of the light produce the same effect, but as we live here in latitude 55°, under a sky generally overcast, we do not find the same conditions as we should there.

Of land and fresh-water invertebrates I have collected only some specimens of worms, mollusks, and arthropods. The worms are represented only by a species of *Lumbricus* and by two *Hirudineæ*.

The mollusks are more numerous, including one bivalve and two or three pond snails, seven land snails, and one slug. Among the land snails there are several extremely small *Helices*, scarcely larger than a pin's head, some of which I suspect to be new. They are surely not the young of the larger kinds, of which I possess young ones also of the same size. As a rule, all these animals are of small size, except a medium-sized *Limnæus*, and with the same exception they are not very numerous.

Of myriapods I have found only a few species, while the spiders have yielded a richer harvest.

As a rule the winged insects seem to be more numerous, with regard to both individuals and species, which is also the case near Petropaulski. In the first place, the mosquitos make themselves very conspicuous. Although not quite in such large numbers as in Kamtschatka, where the furious attacks of their legions sometimes prohibited me from securing a bird I had shot, and usually a valuable one, even here on the island they seriously interfere with the duties of a collecting naturalist. The diurnal lepidoptera seem to be very scarce. I have seen only a single one, early in the spring, on the 21st of May; it was a butterfly, much like if not identical with *Vanessa urticæ* L., but unfortunately the chase was unsuccessful. My lookout for some specis of *Argynnis*, *Erebia* or *Ticris* has been completely in vain. The *Noctuina* are not very numerous either, while the *Geometridæ* and *Microlepidoptera* are more common.

The beetles are not numerous, including up to date only one or two *Curculionidæ*, one or two *Elateridæ*, one *Silpha*, some *Staphylinidæ*, *Dytiscidæ*, *Gyrinidæ*, *Carabicidæ*, and a *Cicindela*, which I have seen at only a single place, although it is a conspicuous species.

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Of crustaceans the fresh-water ponds have yielded a *Branchipus*, some *Gammaridæ*, one *Daphnia*, and one or two other almost microscopical species, which, I think, belong to *Cyclops*.

I can hardly write anything about the fishes inhabiting the rivers and lakes. It will be better to postpone this topic until next year, and I shall limit myself to a mere enumeration of the species observed by me up to date, viz, *Gasterosteus pungitius* L., and *G. cataphractus* (Pall.), *Salmo callarias* (Pall.), (called *Goletz* by the natives here), *Oncorhynchus lycaodon* (Pall.), (Russian, *Krasnaja Riba*), *O. sanguinolentus* (Pall.), (Russian, *Kisutch*), *O. proteus* (Pall.), (Russian, *Gorbuscha*), and the "*Bajdarsik*" of the natives, which I have not yet been able to make out. "*Sik*" is the Russian name of *Coregonus*, but I do not believe that it belongs to that genus, as the mouth extends beyond the eye. Probably it is the same species called *Coregonus* by Nordenskjöld (Vega Expedition, American edition, page 618), as I do not know any other one to which to refer this name; the three other species of which he speaks are *callarias*, *lycaodon*, and *proteus*.

In my next report I hope to be able to add another Salmonoid to the list of the species known (as I suspect the occurrence of such a one).

Batrachians and reptiles are wanting altogether on the island, as might be expected. Dr. Dybowski and I have been searching very eagerly for a *Salamandrilla*, as we suspected the "*Kragani*," of which the natives told us, to be such an animal. It turned out, however, to be a large *Dytiscus*.

The ornithologist starting for Bering Island will probably prepare himself beforehand for hunting and collecting two large, rare, and interesting birds, viz, *Thalassaëtus pelagicus* (Pall.) and *Phalacrocorax perspicillatus* Pall., as Pallas, on Steller's authority, gives Bering Island as their proper habitat, where they occurred in abundance. You will not be more disappointed than I am in learning that there is no hope whatever of getting a specimen of the latter, and very little of obtaining any of the former from Bering Island.

It is not to be doubted that the *Phalacrocorax perspicillatus* does not occur on the islands at present. The natives, however, remember very well the time when it was plentiful on the rocks, especially on the outlying islet Are Kamen. About thirty years ago, they say, the last ones were seen, and the reason they give why this bird has become exterminated here on the island is that it was killed in great numbers for food. They unanimously assert that it has not been seen since, and they only laughed when I offered a very high reward for a specimen.

When Pallas gives Bering Island as the habitat of the *Thalassaëtus* I feel tolerably sure that he has misunderstood Steller's words, or that Steller, if he really has reported its occurrence, met with only a straggler from

Kamtschatka. The former supposition seems to me to be more probable, for the reason that Steller, in his description of Bering Island, does not mention this eagle.* He, however, speaks of an eagle in the following terms: "Von seltnern, an der sibirischen Küste nicht gesehenen Vögeln habe ich dort [Bering Isld] einen besondern Seeadler mit weissem Kopf und Schwanz . * * * angetroffen * * * jener nistet auf den höchsten Felsen, und sie haben im Anfang des Junius Junge, die ganz mit weisser Wolle bedeckt sind." This is the same bird of which he speaks in his "Beschreibung von dem Lande Kamtschatka" (1774), pp. 193–194, as follows: "Eine Art unbekannter und sehr schöner Adler, so aber in Kamtschatka viel seltsamer vorkommen als in America und den Inseln im Canal, dahero auch solche bis diese Stunde noch nicht erhalten können. Es ist derselbe so gross als der *Haliætus*, ganz schwarz, ausgenommen den Kopf, *Uropygium*, schwarze Füsse† und Schenkel, welche so weiss als Schnee sind. Er macht sein Nest auf hohen Felsen, aus Reisern im Diameter von einen Faden einen Schuh dicke und legt seine Eyer gegen den Anfang des Junii, zwey an der Zahl. Die Jungen sind ganz weiss, ohne einige Flecken; und stiesen die beyde Eltern, da ich auf Bärings Eilande das Nest besahe, dergestalt auf mich zu, dass ich mich kaum ihrer mit dem Stock erwehren konnte. Ohnerachtet ich den *Pullo* keinen Schaden zugefüget, verliesen die Alten dennoch das Nest und baueten sich ein anderes an einen Felsen wohin niemand möglich zu kommen."

I think there can be little doubt that the bird thus described is a *Haliæetus leucocephalus* (Linn.) in spite of the white "thighs," which perhaps is only a *lapsus calami* of the person copying the original manuscript, this being, as we know, only a rough draught of Steller's, in common with the "black feet." The following are my special reasons: 1. The habitat given by Steller agrees exactly with that of *H. leucocephalus*, while *T. pelagicus* is common in Kamtschatka, and does not occur at all in America; 2. "White head" can only be said about *leucocephalus* and not of *pelagicus*, which has merely the forehead white; 3. If Steller had intended to describe the *pelagicus* he would not have overlooked the white shoulders, a much more conspicuous feature than the white forehead; 4. Even if Steller's manuscript contained the words "thighs white" it would be of little importance, as it seems that he did not kill the bird and only made the description from the living animal. In *pelagicus* the whole abdomen is white. The supposition here advanced seems the more plausible, as a pair certainly belonging to this species still breeds in the neighborhood of the place where Steller and his comrades wintered. Besides, *T. pelagicus* inhabits exclusively the dense and large forests, and is not known to rear its young ones in such treeless localities as those of Bering Island. When it occurs here, it is, at

*Neueste nord. Beitr., II (1793), p. 229.

†This is completely senseless. I conjecture it to be a misprint for "Schwanzfedern."

present at least, only as a lonely straggler from Kamtschatka, usually a young bird, and there is no reason why this should have been different during Steller's time. I have seen such a young bird here, shot on the island, obtained by Mr. Grebnitzky, and forwarded by him to the Academy in St. Petersburg. It was in the same plumage as the young specimen in the National Museum. The measurements are as follows: Total length 910^{mm}; chord of culmen from forehead to tip 85^{mm}, from cere to tip 68^{mm}; radius of curvature of culmen from cere to tip 41; bill from tip to mouth 84, to hind angle of nostrils 62, and from this point to fore angle of eye 40^{mm}; height of upper mandible at upper border of cere 37, and its breadth at the lower border of cere 27^{mm}; gonys, 29; wing, 630; tail feathers, 340^{mm}; from feathering on front of tarsus to base of middle claw 142; chord of the latter 34, and of its hind claw 44^{mm}.

It will be seen from the above statement that the bald eagle is an inhabitant of the island, but I can affirm that it is very scarce at present in proportion to what it must have been only a few years ago, judging from the many abandoned nests and from reports of the residents.

But it seems as if a third species of sea eagles should be added, not only to the fauna here, but even to the list of known birds, for I have never seen a young *Haliœetus* with the whole lower surface almost white, and the upper side with dark tips and edgings on a whitish bottom, such as my No. 1055. This, a young ♀, still with black tail, was shot on the 15th of May, measuring in total length 890^{mm} (35 inches), with a stretch of wings of 2.220^{m} (87.40 inches); iris, faint yellowish white; bill, horny brown; cere, yellow with horny brown shadings on the back; feet, bright golden yellow.

Compared with the young of *H. leucocephalus* of the same age, it has, quite in contrast with the white color of the body, the tail feathers, under tail-coverts, and axillaries still darker colored. The size is not inconsiderably less than that of the bald eagle, as the specimen in question represents the largest size of its kind, being not larger than an old male of the said species. The bill is fully equal in size to that of a young *leucocephalus*, and the feet likewise; but the body, tail, and wings are smaller.

I have little doubt that this bird if more mature would have assumed an almost uniform white plumage below, with white tail, a supposition corroborated by the statement of Mr. Grebnitzky, that he himself once has observed here, on the island, an eagle with a white lower surface and tail.

That we do not deal in our case with an albino is evident not only from the color of the eyes, but the character of the whole plumage would also contradict such a theory. The white color does not appear as an irregularity, and the dark colors are deep and distinct.

Upon the whole, I reach the conclusion that the present bird is sufficiently distinct from *H. leucocephalus*, and, consequently, also from *H.*

albicilla (L.). There are two other species, however, of which I know only the names, viz, *H. leucoryphus* (Pall.) and *H. leucogaster* (Gm.); but Dr. Dybowski, who is well acquainted with the former, asserts that this is quite a different bird, while Dr. Henry Guillemard, who has been collecting in Central Africa and is quite familiar with the latter, corroborated the same statement upon seeing my bird during a day's visit here. Both received the impression that the species is a new one.

Did I not have the hope that Mr. Ridgway would take the trouble to compare this specimen with those in the National Museum, and describe it if he should come to the same conclusion, I should not hesitate to give it a name. But as the collection of birds will be placed in such good hands as his, I think it advisable to wait for his decision.

In this connection I will merely mention some other forms which I suspect to have been hitherto more or less unknown, or wrongly known, likewise leaving to Mr. Ridgway the labor of having them compared, described, and named if he should find them to be actually new.

In the first place I call your attention to the four larks, Nos. 1020 and 1117 from Bering Island, and 1242 and 1249 from Petropaulski, where I found this species, in one place at least, tolerably common. The lengths are respectively, 186, 187, 183, and 173^{mm}; iris, dark brown; bill, pale flesh color; culmen and tips of both mandibles, blackish brown; feet, light reddish brown; tarsal joint, dark grayish; toes below, livid; nails, blackish gray. It is much like the common European *Alauda arvensis* L., but it appears to me to have lighter and clearer colors. The size agrees very well with that of birds from Northern Europe.

No. 1251 is another passerine bird, thought to be new. It is a kind of willow-warbler, common in Petropaulski, but not observed here on the islands. My only specimen is a male, shot on the 5th of July, 1882. Total length, 149^{mm}; iris, hazel; feet, clear yellowish brown.

The loud song, consisting of the syllables *witshe-witshe-witshe-witsh*, and somewhat resembling the sound made by whetting a scythe, was heard, especially towards night, from all sides when walking through the high grass and willows covering the swampy slopes of the mountains with a thicket almost impenetrable both to foot and eye. You would very seldom get a glimpse of the watchful songster, when, clinging to the middle of the upright stalk of some high orchid or grass, he did his best in the singing-match with one of his own kind or a *Calliope kamtschatkensis* or a *Carpodacus*. But no sooner would you move your gun to secure the longed-for specimen than he silently disappears, as completely and suddenly as if he possessed Dr. Fortunatus's cap. The only way to obtain a specimen is to watch patiently near one of his favorite bushes, with the gun ready. For hours I have thus sat in the wet swamp, almost desperate from the bites of the numberless bloodthirsty mosquitos, which I did not dare to wipe off, fearing to drive away the silent bird, who perhaps was watching my immovable figure until he was satisfied as to his safety. Curious, but still cautious, he

would come nearer, slipping between the stems and branches nearest to the ground, uttering a very low, thrush-like *tak; tak; tak; tak*, and with the tail straight upright, very much like a long-tailed *Troglodytes* both in color and conduct. And if I kept absolutely quiet he sometimes would proceed close to my feet, looking curiously at me with his pretty dark eyes. But before the challenge of a neighbor had attracted his attention and provoked his reply, which he usually began with a short trill, it would not have been advisable to move a muscle.

Then comes the time to lift your gun very slowly, stopping as often as he suspiciously stops his song, until the "crack" puts an end to it forever, and you hold in your hand a crushed specimen, unfit for preparation, when you have to shoot from too short a distance, or return without anything, while, after a longer shot, you cannot find the plain-looking little bird amidst the immense vegetation in the dim light of the vanishing day and tortured by the intolerable mosquitos. You will understand from your own rich experience how much pleasure it gave me when I, at last, obtained a tolerably good specimen. Should it prove to be a valid species, I would be obliged if the name of its first discoverer, Dybowski, be affixed to it.

The family of sand-pipers is very well represented here on the island, and my collection therefore contains not less than nineteen species, or nearer one-third than one-fourth of the total number of species collected, a number liable to be not inconsiderably increased before the list embraces all the species occurring here as residents or visitors. I must confess that there are several species among my birds which I have not been able to identify, although I have no hope that all these will prove to be new. Thus the most common limicoline bird here is an *Arquatella* (Nos. 1031, 1039, 1044, 1048, 1085, 1107, 1108, 1262, 1344, 1345, 1468, etc.), about which I feel quite sure that it is a very well known species, but as to these birds it is more difficult to determine the species from memory alone than in almost any other group that I know of.

But there are in my collection two species, the common forms of which I have been well acquainted with, showing some differences from these, if I am not quite mistaken. The one is the snipe, which, having only fourteen tail-feathers, comes nearer to the European *Gallinago gallinaria* (Müll.) than to the American *G. wilsonii* (Temm.). But I do not think that the former has the crissum and the under tail-coverts so dark brownish as my specimens, nor is the pattern of their greater wing-coverts quite identical. Snipe-hunting without a dog is exceedingly difficult here. For this reason I have at present only five specimens to send of this bird, which, in suitable localities, is by no means uncommon.

The other one is a form of *Pelidna alpina*, which seems remarkable for its pure colors and the absence of any dark spot on the lores. I cannot unite it with *P. chinensis* Swinh., which has been identified by Taczanowski with *P. schinzii* (Brm.), and consequently must be much smaller than my birds.

Finally, I have referred five birds (Nos. 1637, 1641, 1646, 1652, and 1659), with much doubt, to the genus *Tringites* Cab., on account of the very short bill, this being considerably shorter than the head, and the long toes exceeding the tail by their whole length when stretched backwards. The feathering of the bill seems to me likewise to be more protracted than in other *Tringinæ*, although not to such a degree as given for the American *T. rufescens* (Vieill.). Besides, there are no black mottlings on a white ground on the wing, only some faint whitish mottlings at the base of the remiges as it is often seen in *Tringæ*. A conspicuous feature is the fine black bristles before and below the eyes, almost encircling them, and, upon the whole, more developed than in other genera. The color, except the rusty crown, is to a certain degree like the plumage of the snipe, and the bill, being somewhat widened, grooved, and furrowed at the tips, and having a very long nasal groove, also remotely resembles that of the bird mentioned.

The total number of species collected during these months amounts to sixty-one, without counting those collected in Petropaulski; and, besides these, I have observed about ten species of which no specimens have yet been secured. Among the latter is *Sterna longipennis* Temm., of which a specimen was shot during my stay in Petropaulski, but on my arrival I found it in such a state of decomposition that it was quite impossible to preserve it. This species bred on the island, but only in four pairs. I looked in vain for your *Sterna aleutica*. Upon the whole, the poverty of representatives of the subfamilies *Sterninæ* and *Larinæ* is very noticeable; thus, for instance, I have met with only one species of the genus *Larus*, *L. glaucescens*, Licht., being not so numerous, however, as one might expect.*

Of the seventy or more species obtained or observed here during the four months (of which one was spent on the trips to Petropaulski) from the middle of May to the middle of September, about one-third consists of circumpolar birds, one-third Pacific birds, while the remaining third is palæarctic, or consists of East Asiatic forms. Only a few species can be regarded as American, viz, *Haliætus leucocephalus* (L.), also occurring in Kamtschatka, and a *Branta*,† which I have provisionally identified as *leucopareia* (Brandt). During my absence in Kamtschatka a specimen was shot in the neighborhood of the village, and ——eaten! Fortunately, however, the head and upper part of the neck had been

* The species of *Larus* observed on Toporkof Island by Dr. Kjellman and Dr. Stuxberg belongs here. From the translation of a portion of Professor Nordenskjöld's narrative of the Vega expedition in Henry Elliott's monograph of the Seal Islands, p. 113, it would seem as if they also had found this bird there "by the millions." The American edition by Leslie, p. 617, shows, however, that they expressly restrict this statement to *Fratercula cirrhata* in accordance with fact.

† Sundevall (Tent. meth. disp. Av., p. 145, 1872) has substituted for *Branta* Scop. *Brenthus* "Antiq.," a name accepted by some later authors, for instance Dr. Richenow (Orn. Centralbl., 1882, p. 36), but *Brenthus* is preoccupied for a genus of *Coleoptera* since 1826.

cut off for my inspection, and with some difficulty I succeeded in skinning and preserving it. Besides the six downy young ones, a specimen was captured alive, and I hope to keep it safe from the numberless (about 600) old dogs of the village until it has assumed its full plumage. Whether the *Anorthura* belongs to *alascensis* Baird, or to *fumigatus* Temm., or whether these two are identical is beyond my present knowledge. On the other hand, I am very doubtful as to the groups to which *Hierofalco candicans* (Gm.) belongs. *Acanthis exilipes* (Coues) I regard as circumpolar, as I think it hardly practicable to separate the palæarctic form from the American one.

It is not my intention to give at present any list of the birds, but merely a brief enumeration of the more interesting species of the old world not mentioned above:

Fringilla montifringilla L.
Leucosticte brunneinucha (Brdt.).
Euspiza aureola (Pall.).
Anthus sp.
Motacilla kamtschatica "Pall." (Auct.).*
Phyllopneuste borealis Blas.

Cuculus canorinus Cab.—I have one specimen from Petropaulski, one from Copper Island, and one from Bering Island. In the former the stomach was filled with the remains of *Bombus*, in the latter two with a plenty of *Gammaridæ!* The cry is exactly like that of the European species.

Charadrius fulvus Gm.
Eudromias mongolicus (Pall.).
Ægialitis alexandrinus (L.).
Totanus glareola (L.).
Totanus nebularius (Gurm.).
Tringoides hypoleucos (L.).
Actodromas temminckii (Leisl.).
Actodromas damacensis (Horsf.).
Actodromas subminutus (Midd.).
Nettion falcatum (Pall.).

* This form is usually quoted as *M. alba* var. *kamtschatica* Pall., Zoogr. Ross.-As., but I recollect very well that Pallas (*op. cit.*) does not give such a name. It has usually been identified with *Motacilla japonica* Swinh. (=*M. lugens* Temm. et Schleg., Faun. Jap.), but until we have learned whether the "black cheeks" of the latter is a mistake or not, I think it will be safest to keep the Kamtschadalian bird separate under the above name, as its cheeks are white with only a well-defined black stripe through the eye. The specimen from Petropaulski proves the identity of the birds here from the island with those of Kamtschatka. I now think that the birds in the National Museum, collected in Siberia by Mr. W. H. Dall and Dr. Bean, as also the specimen seen by Mr. Turner on Attu and the bird from California, all referred to *M. ocularis* Swinh., belong rather to *M. kamtschatica*, being young, or in winter plumage, with gray back. *M. ocularis* seems to be an inland bird, not at all occurring on the Pacific coast.

Of course the relations of the constituents of the ornis, as given above, are based only on a rough judgment, but it is thought that the zoögeographical affinities of the islands are tolerably well expressed. It is to be expected that the additions which the fauna is likely to receive during the following eight months will raise the percentage of the circumpolar birds.

The ornis, however, is characterized not only by what it possesses but also by what it lacks. Thus I had expected to find *Saxicola œnanthe* (L.) and *Budytes flava* (L.) (in Petropaulski I found the latter breeding, being more like the typical form than any other I have seen) and an *Otocoris*, to which the frequent sand-dunes offer favorite breeding places, one or two Siberian true *Emberiza* and *Schœniclus*, *Chelidon erythrogaster* (Bodd.)* (abundant in Petropaulski), and an *Archibuteo*. The orders *Herodii* and *Alectorides* are wanting altogether, and the remarkable poverty of the *Laridæ* I have already mentioned.

As a matter of course, my time was wholly occupied in collecting and preserving specimens of every branch of natural history, studying the rookeries, and taking meteorological observations. I had scarcely any opportunity for special ornithological studies.

Some observations, however, relating to the seasonal change of plumage of the ptarmigan occurring here (*Lagopus albus* Gm.) may perhaps be of some interest, as it forms a question involving the most contrary opinions among observers. Want of time will not allow any revision of the matter at present. For this reason I give the observations as they were written in my journal with the fresh birds before me.

With regard to No. 1342, a ♂ shot July 29, 1882, I find the following notes: The feathers on head, breast, and abdomen are old; that is to say, they are without any trace of the "outer follicle," and thus are also all the single white feathers, found mixed here and there between the brown ones on the upper surface. Almost all the dark feathers have their bases more or less concealed in the sheaths, and between these protrude still "unblown" sheaths with brown terminal pencils—in short, brown feathers in all stages of growth. The few dark feathers, also, on the hypochondries, some of which have white terminal spots, show the same phases. None of the white feathers are new. Between the white ones on the breast some sheaths are seen protruding, but still without end pencils, showing themselves, however, to be dark ones, when opened.

Another ♂ shot about fourteen days later (August 10, No. 1419) shows exactly the same conditions, only that the new dark feathers on the lower parts among the white ones are more developed, being blackish with white terminal spots.

The ♀ shot the same day (No. 1418), with the whole portion covering the sternum, the inner sides of the femora, and the fore part of the ab-

* I have no doubt that this species is identical with the North American bird, as both color and size agree very well with your description in Rev. North Amer. Birds, I, p. 295.

domen absolutely naked, has the feathers more uniformly developed, as most of the dark ones are fully grown out, only a few on the interscapulum being still partly in the sheaths. Besides, two or three new, yellowish-colored feathers protrude from the naked parts.

During my boat expedition around Bering Island in the latter part of August, I procured several males, two of which, being the most interesting ones, were prepared. Unfortunately, the bad weather almost spoiled them afterwards. (Nos. 1487 and 1489.) The following remarks are an extract from my journal of August 23: The summer plumage is now wholly developed in all specimens, as the dark or rather black feathers of breast and abdomen are out too. Some few dark ones, however, are still in their sheaths, this being especially the case in the aforesaid parts of No. 1487. But the white feathers are in progress on the same parts too, being, especially in No. 1489, developed to such a degree that the breast and abdomen are white already in the middle from the half "blown" new white feathers. In No. 1487 new black and white feathers occur on the same parts and in the same state of development. Consequently it follows that the moulting of the winter plumage does not extend beyond the breast and abdomen; these parts for a short time assuming black feathers, while at the same time the new white feathers of the coming winter plumage make their eruption on the same parts, and that the change of the summer plumage first begins where it had last been assumed. The same remarks are applicable to the wing coverts, with the modification that the greater part of these is white through the whole year, the new and the old white feathers staying side by side in my specimens. In the latter the inner wing feathers are new, while the three outermost primaries still remain from the foregoing year. The shafts of the new primaries are dark gray, this color being faded and almost invisible on the old ones.

The specimens show a very marked difference in color of the upper surface. No. 1489 has the upper parts darker, less rusty, and the feathers less distinctly banded, thus assuming a more irregular and more minutely watered aspect. It must be remarked, however, that in No. 1487 the few feathers still undeveloped, are of a darker color and of a pattern more like those of No. 1489 than the more rusty colored feathers of the remaining upper plumage. But these feathers are so few in number that I feel satisfied that this specimen at least would not have assumed any new plumage before the final change into the white winter plumage. The dark specimen has also some new and "unblown" feathers among the old ones on exactly the same parts as No. 1487. From this I feel very much inclined to believe that the difference is caused by age, and I doubt at present very much the idea of Professor Lilljeborg that the darker plumage signifies a special autumnal plumage. It seems to me that we may reasonably conclude that *Lagopus albus* in this region is subject to an uninterrupted change from the moment when the first dark feathers make their appearance in spring until the last one

has disappeared in fall, and that no marked seasonal plumage can be distinguished, except the white plumage of the winter and the dark one of the summer.

But it will be well to recollect here that the moulting of these birds depends so much upon the climate that one can hardly conclude from observations made in one country what the condition in another is. The many unpleasant quarrels about this theme have arisen from want of understanding the fact that it does not follow that an observation made in the north is erroneous because it differs from another made in the south, or *vice versa*.

I must confess, however, that the theory of a change of color from winter to summer plumage, without change of feathers, and the observations upon which it rests, is an insolvable problem to me.

The past four months form a season during which I had very little opportunity for observing or collecting cetaceans, and consequently I have but little to report about them. It is, however, to be expected that the fall and winter will prove richer, and that I may be able to satisfy you better in this repect next year. But as the natives have no means of capturing the living animals, I shall have to depend exclusively upon what may occasionally be cast on shore.

The female finback whale which we found during our boat expedition at Lissonkavaja Buchta, on the 23d of August, seems to me to belong to *Balœnoptera velifera* Cope, agreeing tolerably well with it in dimensions and proportions, of which I give a table below. The baleen, of which I have secured some pieces (No. 1629) for comparison with specimens of the above-named species in the National Museum, has on the shorter layers a whitish color, with dark bluish-gray longitudinal and parallel stripes. These stripes increase in breadth, number, and darkness of color towards the longest baleen, which is dark bluish-gray with light stripes.

The base of the dorsal fin commences about at the terminal third of the body, and is placed almost directly above the anus. Its height—that is, the vertical from its tip to the back—is about $\frac{1}{30}$ of the total length of the body, which is about $6\frac{1}{2}$ times the length of the pectorals.

From this it will be seen that the exterior proportions are somewhat similar to those of *Sibbaldius laticeps* Gray, except that the pectorals are smaller in the latter species.

The dorsal fin is perfectly falcate with deeply incised posterior edge, showing that the animal does not belong to the var. *borealis*.

The color could not be ascertained, as the animal had been lying so long on the beach that it was perfectly yellowish white with the exception of some blackish patches on the shoulder region.

The impossibility of moving or lifting the colossal body prevented me from taking measurements in a straight line. For the same reason I could not obtain any measurement of the circumference.

The average breadth of the pectoral folds I found to be 80^{mm} (3.15 inch.), and that of the eminences between them about 50^{mm} (1.97 inch.)

In spite of a minute search for parasitic animals, none could be detected.

Dimensions.

	Meters.	English feet and decimals.
Total length from tip of upper jaw to notch of caudal fin along the back	15.77	51.69
Length from tip of lower jaw to notch of caudal fin along the abdomen	18.63	55.21
From end of upper jaw to spiracles	3.60	11.81
Length of spiracles	0.40	1.31
From end of upper jaw to anterior end of dorsal fin	10.60	34.78
Length of dorsal fin	0.75	2.45
Vertical from tip of dorsal fin to the back	0.42	1.37
From posterior end of dorsal fin to caudal notch	4.42	14.50
From end of upper jaw to corner of mouth	4.10	13.45
From end of lower jaw to corner of mouth	4.40	14.44
From end of upper jaw to anterior edge of upper lip	0.18	0.59
From end of upper jaw to anterior corner of eye	4.30	14.11
Longitudinal diameter of eye-opening	0.10	0.33
From end of lower jaw to anterior corner of vulva	13.00	42.65
Length of vulva	0.60	1.97
Length of perineum	0.10	0.33
Length of anus	0.15	0.49
From posterior corner of anus to caudal notch	4.78	15.68
Length of pectorals along anterior border	2.60	8.53
Breadth of pectorals at base	0.50	1.64
Length of lobes of caudal fin from tip to notch	2.10	6.89
Length of lobes along the exterior margin	2.65	8.69
Breadth of lobes at the notch	1.10	3.60
From vulva to nearest breast-fold	2.00	6.56
Length of longest baleen, exposed part	0.55	1.80
Breadth of longest baleen at the insertion in the gum	0.22	0.72
Length of fringe of longest baleen (average)	0.15	0.49
Length of shortest baleen, exposed part	0.34	1.08
Breadth of shortest baleen, at the insertion in the gum	0.16	0.52
Length of fringe of shortest baleen (average)	0.10	0.33

Besides this larger kind of whale, several denticetes occur in the waters around the islands, but, as the natives do not hunt them, they are captured only when they are cast ashore, which does not happen very often. Thus a sperm whale (*Physeter macrocephalus?*) was cast on shore some years ago, yielding a rich harvest of oil and blubber. Besides an *Orca*, which is said to visit the rookeries, but of which I have not been able to procure any specimen, or even to see one, there are at least two species of the family *Ziphiidæ*, both undescribed, as I suppose. I am very much indebted to Mr. Grebnitzky for a skull of each of the species, for one of which I should like to propose the name *Berardius bairdii*, as a slight token of my esteem and gratitude.

As I am now almost without any literary means, I find it impossible to decide with certainty in what genus this species will finally have to be placed. But I think that the supposition that this specimen (No. 1520) is a young *Berardius* may not be very far out of the way. At first I suspected that it is a *Dioplodon*, but the size of the skull, in connection with the distinctness of the sutures, the evident maxillary crests, and the terminal position of the teeth, very soon led me to the above conclusion.

The specimen in question has very low and scarcely incurved maxillary crests; the shortest distance of which is two and two-thirds times greater than their greatest height, and although it still is in its "adolescent" stage, I should greatly doubt whether the crests in this species ever become developed to such a degree as, for instance, in *Hyperoödon diodon* (Lacép.). The groove between the maxillary and the nuchal crest is very shallow. The maxillary notch is deep. The beak is long, making only a little less than half the length of the entire skull. Nares straight; right nasal larger than the left one, but not very much. The occipital condyles do not come in contact beneath the foramen magnum; the symphysis of the lower jaw is very short, amounting to only one-fifth of the whole length of the jaw.

Want of time and books prevents me from making more extended remarks, and until I can present an exhaustive and comparative description, I shall have to content myself by giving a provisional table of dimensions. The following dimensions are in millimeters and English inches, and are in every case measured in a straight line:

	Millimeters.	Inches.
Length of skull	1405	55.32
Greatest breadth	698	27.48
Greatest height	530	20.87
Length from the process of supramaxillaries before orbit to posterior edge of condyles	610	24.02
Length from the same process to tip of beak	890	35.04
Depth of maxillary notch	50	1.97
Length of premaxillaries	1222	48.11
Premaxillaries reach beyond supramaxillaries	134	5.28
Distance of upper edge of maxillary crests at their anterior end	228	8.98
Distance of same at their middle	358	14.10
Greatest height of maxillary crests	86	3.39
Length of visible part of vomer	325	12.80
Distance from anterior tip of vomer to tip of beak	275	10.83
Length of pterygoids	295	11.62
Height of foramen magnum	70	2.76
Width of foramen magnum	80	3.15
Distance of condyles at upper edge of foramen magnum	100	3.94
Closest approximation of condyles beneath the foramen magnum	2	0.08
Entire length of lower jaw	1292	50.88
Height of lower jaw at second tooth groove	100	3.94
Length of symphysis	257	10.12
Greatest diameter of foremost tooth groove (longitudinal)	100	3.94
Shortest diameter of foremost tooth groove (transverse)	45	1.77
Greatest diameter of posterior tooth grove (longitudinal)	40	1.58
Shortest diameter of posterior tooth groove (transverse)	35	1.38
Distance between the tooth grooves	65	2.56

This specimen was found stranded in Stare Gavan, on the eastern shore of Bering Island in the fall of last year, and only the skull was preserved. From analogy I should judge that the entire length of the animal must have been about 18 feet (5½ meters). This species is well known by the natives for the cathartic quality of the blubber, resembling in this respect the Atlantic "Dögling," or "Anarnak" (*Hyperoödon diodon*). The Russian name, by which the inhabitants here designate this whale, is *Pla-un* (sp. Pläoon), while the Aleut name is *Kigan agalusoch*, the meaning of which is said to be "having teeth on the nose,"

a very inappropriate designation, as the teeth are situated on the tip of the lower jaw, and not on the nose.

The second species, founded on my No. 1521, seems to belong to the Cuvierian genus *Ziphius*, having for its type *Z. cavirostris* Cuv., and more especially to the group (*Petrorhynchus* Gray) which is characterized by having the nasals, in connection with the premaxillaries, formed to a vaulted roof over the nares, and the ethmoidal cartilage ossified and extending above the premaxillaries in the anterior part of the beak.

I take great pleasure in dedicating this interesting species to its discoverer, the obliging governor of the Commander Islands, Mr. Nicolaj Grebnitzky, to whom science is indebted for these and many other contributions, and myself for so much courtesy. I propose to name it *Ziphius grebnitzkii*.

That the typical specimen is an old animal is evident from the fusion of the bones and the indistinctness of the sutures, thus making it somewhat difficult to distinguish the individual bones.

After my return from here I shall give a more complete description and figures; but in the mean time the following characters may serve for the identification of the species, as I consider most of them diagnostic:

The tip of the beak is obtuse, with a vertical furrow in the middle, the lower jaw with the two terminal teeth protruding considerably beyond the upper one. From about the middle of the beak towards the tip the mesethmoidal, ossified in its whole length, arises, like a rounded staff, between and above the premaxillaries, following these to the tip and being totally fused together with them. The nasal groove is very unsymmetrical, owing to a very prominent asymmetry of the premaxillaries and the nasals, so that the direction of the oblique nares forms an angle of not less than 20 degrees with the vertical plane through the longitudinal axis of the skull. The right os nasale and the premaxilla of the same side are by far the larger ones, and form the principal part of the roof above the nares, the nasal not reaching, however, so far forward as the premaxilla. The antenasal groove is large, and in the anterior half partly vaulted over by the edges of the premaxillaries, which are somewhat bent inwards.

The zygomatic process of the squamosals touches the orbital process of the frontals without coalescing, however. The jugale is not narrower in the fore part, which, consequently, is not dilated and does not reach the posterior maxillary notch. This is not particularly deep, and the anterior one is still more shallow. The visible part of the vomer is long and narrow, commencing 124^{mm} (4.88 inches) from the tip of the beak. The supraoccipital is rather inclined forwards, forming an angle of about 40° with a line parallel to the vertical axis of the skull.

The following table of dimensions contains the more important measurements in millimeters and English inches:

Table of dimensions.

	Millimeters.	Inches.
Length of skull in straight line	983	38.70
Greatest breadth	600	23.62
Greatest height	525	20.67
Length of beak from anterior maxillary notch to tip	485	19.10
Length of premaxillaries	835	32.88
Breadth of right premaxilla in front of nares	147	5.79
Breadth of left premaxilla in front of nares	93	3.66
Greatest length of right nasal	135	5.32
Greatest breadth of right nasal	84	3.31
Greatest length of left nasal	128	5.04
Greatest breadth of left nasal	40	1.58
Distance from tip of beak to anterior point of nasal roof	690	27.17
Greatest distance of premaxillary crests at fore border of nares	232	9.13
Length of visible part of vomer	258	10.16
Length from anterior end of vomer to tip of beak	124	4.88
Greatest height of foramen magnum	62	2.44
Greatest breadth of foramen magnum	56	2.21
Distance of condyles at upper edge of foramen magnum	95	3.74
Closest approximation of condyles beneath foramen magnum	10	0.39
Length of lower jaw	845	33.27
Lower jaw beyond the tip of the upper one	64	2.52
Length of symphysis	180	7.09
Height at posterior margin of symphysis	66	2.60
Longitudinal diameter of tooth at base	26	1.02
Transverse diameter of tooth at base	20	0.79
Height of tooth	36	1.42

It will be seen that the symphysis of the lower jaw is comparatively short, making only about one-fifth of the entire length of the jaw.

The species occurs here on the island, and my specimen was obtained in the same way as the one previously mentioned.

The natives employ the same names for both, considering them to belong to the same kind. The same defect which makes the *Berardius bairdii* unfit for food for men and dogs is also ascribed to Grebnitzky's Small-headed Whale. That these two whales should be confounded is not so strange, however, when we come to consider that the total length of the two animals, in spite of the much smaller skull of the latter, is nearly the same; for in the same manner as I judged the former to have a length of about 18 feet, I estimate the present old specimen to have been about 20 feet (6¼ meters) long, a length which the adult of Baird's beaked whale will probably also reach.

The most interesting objects in the natural history of these islands are unquestionably the remains of the extinct northern sea-cow (*Rytina* gigas* (Zimm.) 1780† = *Rhytina stelleri* (Fischer) 1814, and at present the success of the collecting naturalist here depends more or less upon the harvest of bones of this animal which he may be able to send home.

As to my own results in this respect, I shall give you a separate, detailed report, from which you may learn the peculiar difficulties connected with this part of my operations, and the account of the "circum-

* The original spelling of *Illiger*, 1811.

† *Manati gigas* Zimmerman, Geogr. Gesch. II (p. 426). Besides, there are two other specific names older than Fischer's *stelleri*, viz, 1785, *Manati balænurus* Boddaert, Elench. Anim. (p. 173), and, 1800, *Trichechus borealis* Shaw, Gen. Zool. I (p. 240).

navigation" of Bering Island will show you likewise some of the ways in which these skeletons are deposited, preserved, and found.

At this place I shall present only a few remarks, occasioned by the inspection of the 11 skulls which I have obtained, and the two belonging to Dr. B. Dybowski, now in Petropaulski.

It is obvious at first sight, when comparing this series, that a remarkable individual variation is shown by each one of these skulls. Setting aside the differences caused by the more or less perfect state of preservation, these variations especially embrace the more or less marked developments of the lines, crests, protuberances, and processes for muscular insertion, and the more or less robust formation of special parts. Although the skulls are of about the same size, these differences, I think, are due to age, as it is very probable that these large animals must have reached an almost patriarchal age, and that the development of the bones in consequence hereof has been proportionally slow, continuing even after the skull had obtained the full and final size.

But, besides these individual variations, there is another striking difference, which divides the series into two well-defined groups. Dr. Dybowski and I stood side by side, looking at several skulls before us, and I had no sooner perceived and showed to him this fact than he was impressed in the same manner. We now eagerly sought for confirmation in the other skulls, and as we, by a careful examination, found a no less marked difference in the shape of the lower jaw, we brought together a tolerably good collection of these bones, commencing an exhaustive series of measurements to serve as a foundation for and proof of our discovery.* I have given below two tables containing the more interesting of these measurements.

The idea of two different species or varieties of the sea-cow was very soon rejected, and without much hesitation we agreed that the difference is a sexual one. This seems to be the only reasonable solution, and, judging from analogy we think that the broader and more robust skull belongs to the male, while the narrower and more slender one is that of the female, a supposition corroborating the opinion of the natives, who also have been aware of the difference. Of this, however, we were not informed until much later, when we made inquiries about the matter; but we could not learn whether this assumption is founded on traditions from the time when these animals still occurred in the surrounding waters or not.

*I call it thus because I doubt whether a similar observation has been published by any one before. This is, maybe, somewhat daring, considering our want of literature, but I prefer to take this risk rather than to wait until next year, and perhaps come too late with "the discovery."

Table of dimensions of skulls of RYTINA GIGAS (Zimmerm.) *not including those of the lower jaw.*

Measurements.	Collectors' No.								Average measurement.	Average measurement.
	Dyboski No 1.	Stejneger No. 1110.	Stejneger No. 1207.	Stejneger No. 1062.	Stejneger No. 1550.	Stejneger No. 1056.	Stejneger No. 1193.	Stejneger No. 1181.		
Supposed sex	♂	♂	♂	♂	♂	♀	♀	♀	5♂	3♀
	mm.	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*
1. Total length from superior margin of foramen magnum to tip of intermaxilla	676	654	636	672*	625*	655*	645	662	653	654
2. Greatest breadth at zygomatic arch	353	353	342	360	338	330	324	331	349	328
3. Distance of tips of occipital mamillar processes	270	266	266	257	264	240	261	258	245	253
4. From mamillar process to posterior angle of zygomatic process of supramaxilla	305	280	280	288	280	295	284	285	287	288
5. Greatest breadth of occipital at base of mamillar process	261	277	254	246	258	269	250	260	259	260
6. Breadth of basilar part of occipnt at posterior end of *eminentia ovalis* BRDT	47	61	45	50	46	51	48	45	50	48
7. Breadth of condyloid rami of occiput	51	54	42	47	45	52	47	45	48	48
8. Closest approximation of condyles beneath foramen magnum	66	63	75	51	68	78	67	80	65	75
9. Greatest distance of exterior margins of condyles	222	233	215	218	210	215	205	220	220	213
10. Distance of exterior, posterior angles of parietals	152	177	153	163	148	140	129	145	159	138
11. Distance of exterior, anterior angles of parietals	99	112	101	111	100	96	100	99	105	98
12. Distance of the alveolar margins at exterior tip of intermaxillar process of supramaxilla	84	91	81	78	73?	69	.....	73	81	71
13. Distance of tips of nasal processes of intermaxillaries	74	73	69?	74	77	58	59	55	73	57
14. Length of articular surface of nasal process of intermaxillaries	141	142	.....	140	138	127	136	118?	140	127
15. Breadth of intermaxilla at anterior angle of nasal aperture	74	74	72	69	65	59	57	57	71	58
16. Distance of posterior apices of zygomatic processes of supramaxilla from each other	289	280	263	270	270	265	232	252	274	250

* These specimens have the beak a little defective. Being broken in the same manner, the missing part in each has been estimated to make 10mm.

This table proves the fact that while the longitudinal dimensions are almost identical in the supposed two sexes, most of the transverse dimensions anterior to the occipital bone are much smaller in the female than in the male, the difference averaging from 7 to 25 per cent. of the smaller dimension.

The average measurements give a very clear representation of these relations, and they are therefore very serviceable in trying to express the difference in a diagnosis, because they eliminate the individual variation.*

* I recall here Humboldt's words: "Dass bei allem Beweglichen und Veränderlichen im Raume *mittlere Zahlenwerthe* der letzte Zweck, ja der *Ausdruck physischer Gesetze* sind, welche uns das Stetige in dem Wechsel wis in der Erscheinungen zeigen."

Vol. VI, No. 6. Washington, D. C. June 23, 1883.

It will thus be seen that in the supposed male, the length of the skull is less than twice the breadth at the zygomatic arch [653 < 698 (2 × 349)], while in the female the length is almost exactly two times the breadth (654 about = 656) (2 × 328), and this holds good, not only in the average measurements, but in every single instance:

♂ 676 < 706 (2 × 353)	♀ 655 about = 660 (2 × 330)
♂ 654 < 706 (2 × 353)	♀ 645 about = 648 (2 × 324)
♂ 636 < 684 (2 × 342)	♀ 662 = 662 (2 × 331)
♂ 672 < 720 (2 × 360)	
♂ 625 < 676 (2 × 338)	

We can also express the difference by comparing the length with another dimension, thus: In the male the total length is *less* than 10 times the breadth of the intermaxilla at the anterior angle of the nasal aperture [653 < 710 (10 × 71)], while in the female the length is *more* than even 11 times the same breadth [654 > 638 (11 × 58)], the result being the same in each individual.

♂ 676 < 740 (10 × 74)	♀ 655 > 649 (11 × 59)
♂ 654 < 740 (10 × 74)	♀ 645 > 627 (11 × 57)
♂ 636 < 720 (10 × 72)	♀ 662 > 627 (11 × 57)
♂ 672 < 690 (10 × 69)	
♂ 625 < 650 (10 × 65)	

I think that this will be sufficient at present to show that there exists a well-marked difference, which can be formulated as above. Besides, there are numerous points in which the two groups of skulls can be distinguished, but which cannot be expressed in figures. Unfortunately I cannot give minute comparative descriptions, as the skulls are already packed and shipped.

The same is the case with the lower jaws, of which I herewith give a table of dimensions.

Table of dimensions of mandibles of RYTINA GIGAS (Zimm.).

Dimensions.	Collectors' No.										Average measurement.	Average measurement.
	Stejneger No. 1110.	Stejneger No. 1181a.*	Stejneger No. 1132.	Stejneger No. 1150.	Stejneger No. 1193a.*	Stejneger No. 1056.*	Stejneger No. 1128.	Stejneger No. 1129.	Stejneger No. 1207.a*	Dybowski No. 1.*		
Supposed sex.....	♂	♂	♂	♂	♂	♀	♀	♀	♀	♀	5 ♂♂	5 ♀
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
1. Greatest length of the horizontal ramus..	433	406	426	461	431	423	433	428	436	451	431	434
2. Distance from surface of condyles to inferior, posterior angle..	271	261	267	261	240	297	290	280	280	297	260	289

Tables of dimensions, &c.—Continued.

Dimensions.	Collectors' No.										Average measurement.	Average measurement.
	Stejneger No. 1110.	Stejneger No. 1181a.*	Stejneger No. 1132.	Stejneger No. 1150.	Stejneger No. 1193a.	Stejneger No. 1056.*	Stejneger No. 1128.	Stejneger No. 1129.	Stejneger No. 1207.a*	Dyboroski No. 1.*		
Supposed sex	♂	♂	♂	♂	♂	♀	♀	♀	♀	♀	5♂♂	5 ♀
	mm.	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*
3. Distance from coronoid process to inferior, posterior angle	280	280	292	290	256	320	308	307	316	321	280	314
4. Distance from tuberositas of posterior margin of vert. ram. to inferior, posterior angle	161	183	189	181	154	191	201	190	184	209	174	195
5. Height of symphysis at posterior margin	85	86	86	81	88	90	93	94	108	90	85	95
6. Smallest breadth of vertical ramus	111	109	116	119	98	120	119	115	124	119	111	119
7. Distance of condyles	244	225	254	250	230	231	225	242	232	219	241	230
8. Distance between the inferior, posterior angles	139	145	187	164	152	96	91	124	129	107	157	109

* These jaws evidently do not belong to the skulls having the corresponding numbers on the foregoing table, although they were brought to me together by the natives. As the skulls and mandibles are seldom found together, the natives choose the best-preserved mandible or the one corresponding best as to color, the more as these bones are by no means scarce. This I had decided long before we had conjectured the difference of the sexes, and it will be seen that the remark is also applied to a specimen (No. 1056) in which the supposed sex in both parts agrees.

As I have already remarked, it is very unusual to get a skull with its authentic mandible, for which reason they in all cases ought to be looked upon with critical eyes. The only instance in which I am sure that the two parts belong together is my No. 1110, and as this specimen (in a very good state of preservation) has been regarded by us as the type of the male form, the lower jaws showing a different style are consequently considered to belong to the females.

The differences between the two groups are perhaps more striking in the mandibles than in the other parts of the skull, although the individual variations are very conspicuous too. In general the supposed female mandible is higher, with broader rami, higher symphysis, and more protracted posterior angles, which are bent inwardly towards each other, while in the male they are straight or somewhat turned outward. Thus the proportion between the distance of the two angles and the height of the vertical ramus is very different in the two sexes and may be formulated as follows:

In the male the distance from the articular surface of the condyles to the posterior angle is less than twice the distance between the tips of the posterior angles, while the proportion is the reverse in the female. The words "articular surface of the condyles" can also be replaced by "coronoid process," only that the formula then must be altered so as to read, that the distance from the coronoid process to the posterior angle

in the male is equal to or less than the distance between the angles, while it is greater in the female.

How closely the posterior angles approximate to each other in the female as compared with the male, is clearly expressed by the average figures of this distance and of that between the condyles. While the difference between the figures of the latter only amounts to 11^{mm} it is in the former distance, which is not more than about one-half of the other, not less than 48^{mm} or in other words: The difference between the average distances of the condyles amounts to about 5 per cent. of the smaller dimension, while the difference between the average distances of the angles is 44 per cent.

The average measurements furnish us with still more distinguishing marks. Thus, in the male the distance between the posterior angles is more than one-third of the total length of the horizontal ramus, while it amounts to almost exactly one-fourth in the female. Besides, the former distance in the male is greater than the smallest breadth of the vertical ramus, while the reverse is true in the other sex.

It may be well to give here the measurements of two other mandibles, which were not included in the above table, the one (No. 1202) a very young male, the dimensions of which would have diminished the average measurements so as to obscure the results, while the other (No. 1636), an adult female, was only found after the table had been compiled, when the other jaws were packed and shipped.

The numbers of the dimensions correspond with those of the table above:

Collector's No.	Sex.	1.	2.	3.	4.	5.	6.	7.	8.
		mm.	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*	*mm.*
Stejneger No. 1202	♂	380	245	247	155	84	104	224	122
Stejneger No. 1636	♀	437	288	303	197	99	121	232	112

It is interesting to see how closely the dimensions of the female jaw approximate the average dimensions of the table, and consequently how well they agree with the diagnosis. In the young male the proportions are a little obscured, as the bone has not yet assumed its final shape. The characters of the male jaw, however, are pretty well marked. The outward direction of the posterior angle is especially characteristic.

Concerning the year of the final extinction of the sea-cow I have little doubt that von Baer and Brandt, in supposing it to be 1768, are very nearly correct. That a single individual or two, perhaps, may have survived the others a few years is not impossible, but it is almost certain that such a huge animal, bound to the very coast for its subsistence, hardly could have found a place in which to hide itself from the keen eyes of its pursuers, who were sufficiently numerous and greedy to search for and slay even the last one. Besides, the animal does not seem to have avoided its enemies, a want of intelligence which in a

short time must have been fatal to all. As to the story reported by Professor Nordenskjöld (Vega Exped., Am. ed., p. 606) about an animal seen by two natives still living here, all the residents competent to form an opinion think that he has been deceived. After the investigations made by myself I have little doubt that the natives are right. I find it proper, however, not to publish any details until I shall have returned to Washington.

As to the geographical range of the sea-cow, I have only a few remarks to make. It can scarcely be doubted that it at least occasionally must have occurred on Copper Island. Besides, this is positively affirmed by Mr. Osche, who saw bones there (cfr. "Vega Exped."), an observation, corroborating my own experience. When Professor Nordenskjöld (*op. cit.*, Amer. ed., p. 605) remarks that the sea-cow does not appear to have ever occurred on the Aleutian Islands his statement is contradictory to the information which my friend Lucien M. Turner has received from the natives on Attu.* It would be especially interesting to know whether the statement of the natives, "that a number of bones much heavier than other bones, or more like ivory in weight, are to be found on Semitkhi and Agattu," is true or not.† It is very difficult to see why they should not have occurred on the other Aleutian Islands, as the natural conditions there are the same as here on Bering Island, and the sea-weed, on which the sea-cow fed, is as plentiful there as it is here, or even more so (cfr. the statement of Wosnessenski in Ruprecht, "Tauge des Ochotsk Meeres," Midd. Sibir. Reise. I, 2 p. 202). On the other hand, the probability of their occurence, even occasionally, in the more northern parts of Bering Sea (Nordenskjöld, *op. cit.*, p. 591) seems to be very slight, owing to the scanty marine flora in these waters (Ruprecht, *op. cit.*, p. 203). I have been informed that a certain Mr. Neumann has published in the Journal of the Geographical Society of Irkutzk an account that he had found bones of the sea-cow on the Chukch peninsula, which bones are said to have been deposited in the museum at Irkutzk. Further inquiries proved, however, that the bones were bought by him here on Bering Island. Fortunately, they were destroyed by the great fire in the museum.

* An account of which, I suppose, is now printed in his report.

† Information which I have received from a man born on Attu, but now living here, confirms this statement to a certain degree. Of course, he knows the bones of the sea-cow very well, and he has told me that similar bones, also skulls, occurred on Agattu. But he expressly added, that they were smaller than the bones found here. Neither he, nor another man from Attu, who, besides, did not know anything about the occurrence of such bones on Agattu, nor any of the other Aleuts here, chiefly from Atkha, have ever heard the Aleutian name *Kŭkh-sŭkh-tŭkh*, given by Mr. Turner. May, it, perhaps, have been a smaller kind? Any one familiar with these bones will hardly confound them with bones of either seals or whales. The stories of the natives about living animals in the time of their fathers is probably not more to be depended upon than the similar story which was told Professor Nordenskjöld here on Bering Island.

Finally, a word about the Kamtschadalian name "*Kapustnik*" and the conclusions which Professor Nordenskjöld (*loc. cit.*) derives from it. Steller translated it with "Krautfresser," and Nordenskjöld thinks that this word is specially distinctive of a graminivorous animal. The Russian word "*Kapústa*" signifies cabbage, but here and in Kamtschatka, where cabbage has never been cultivated, it is the local term for just that kind of kelp on which the sea-cow fed. The contents of the stomachs of the stranded animals give a natural reason for the name, and no support for the supposition that the sea-cow ever visited the coasts of Kamtschatka alive can fairly be derived from it.

I cannot close the chapter on the sea-cow without adding a few words about the exterior form of the caudal fin, a question highly exciting the scientific world in Washington when I left in the spring. It will be remembered that Mr. Henry W. Elliott made a restoration of the animal, showing the shape of the tail like that of the southern manatee, in spite of the only authentic information on the subject handed down to us by G. W. Steller, the eminent and conscientious naturalist. Besides, there is an old drawing, reproduced by Middendorff and by Nordenskjöld, agreeing with and consequently corroborating the statement of Steller, likewise representing the whale-like shape of the fin. The statements which I have had the opportunity to see (besides Brandt's Latin translation of Steller's words) are found in Neueste nord. Beitr. II, p. 292, "Typogr. Beschr. der Bering Insel," where he says: "Bis an den Nabel vergleicht sich dieses thier den Robbenarten, von da bis an den Schwanz einem Fisch"; and in Krashenninicoff's "History of Kamtschatka," the English edition, 1764, I find the following words: "The tail is thick, and bent a little towards the end; it somewhat resembles the beard of the whale, and somewhat the fins of a fish.

The sources of Krashenninicoff's notes about the sea-cow are, however, only Steller's manuscripts, which were placed at his diposal (cfr. the preface, *op. cit.*, p. vi). There is said to be a drawing in Pallas's "Icones ad Topogr. Ross.-Asiat." (fasc. II), and reproduced in Nordenskjöld's "Vega Exped.," Am. ed., p. 607, pretending to be a sketch made by Steller himself, and showing a very bifurcated and lobated fin.

I remember that the authenticity of this drawing was objected to on the ground that Nordenskjöld's statement of its having been given to Pallas by Steller evidently was false; but Nordenskjöld, *loc. cit.*, only says: "Sketch by Steller, given to Pallas," which is not the same as "Sketch given to Pallas by Steller." That Steller had a sketch of the animal is evident from the words in his "Beschreibung von Kamtschatka," 1774, where (p. 97) he says that he has "sehr weitläüftige Beschreibungen verfertigt, und sie zugleich zeichnen lassen," and it is therefore very probable that Pallas, who had so many of Steller's manuscripts, also had the said drawing. While now all the direct information agrees on this point, it is a very memorable fact that we, if we had only had

the caudal vertebræ of the skeleton left, and no descriptions of the exterior shape of the fin at all, nevertheless would have been forced to restore it as a whale's tail. The large transverse processes of these vertebræ must have had a special function, namely, to support a tail having a fin like that of a whale or a dugong, which have the same kind of processes, and not like that of the manatee, which is destitute of them. By seeing these vertebræ, I feel now more convinced than ever that there is no reason for supposing the old view, which even led to the specific name *Manati balænurus* (1785), to have been incorrect. It has been said that "nature" is not so contradictory as to provide such a sluggish animal like the sea-cow with the tail of the swift whale, a thought as ridiculous as to imagine "a rhinoceros with the legs of a race-horse." But it is to be remarked: 1, that the swiftness does not depend upon the shape, but merely upon the relative size, and upon the strength of the moving muscles; 2, that a careful study of Steller's words shows that it was not at all impossible for the sea-cow to move even very rapidly; and, 3, that "nature" would have been able to effect even extreme swiftness by a fin like that of the manatee, if it had been necessary, as it is a well-known fact that animals with legs as clumsy as those of a rhinoceros or an elephant are able to run as fast as a good horse.

I think I hardly need apologize for passing the fur-seal (*Callorhinus ursinus*) and its allies in silence, until I have had further experience. There is nothing gained by making a few more or less insignificant remarks on a matter about which an elaborate work has been published under your superintendence in this very year, especially as none of them are of such importance as to make a speedy publication desirable. On the whole, I am in a position to affirm most of Mr. Elliott's statements. But as a matter of course there must be some differences, caused partly by the local circumstances and partly by the fact that two observers do not always view the same thing in the same light. It is therefore evident that many of my final notes will take the form of more or less critical remarks on Mr. Elliott's monograph, an additional reason why I should wish to retain them until they have been subjected to a new and thorough test.

But an erroneous statement of Professor Nordenskjöld (Voy. Vega, Amer. ed., p. 609), that the list given in the note (*loc. cit.*) only embraces the fur-seals killed on Bering Island, must be corrected at once, as from the wide distribution of his book it is likely to be repeated by others not going back to the original source.* The following is an authentic

* Evidently he has understood Elliott's list as concerning only Bering Island. In his monograph, p. 113, Mr. Elliott gives the same figures with regard to "the Commander Islands," but without correcting Nordensjöld's mistake. The list actually embraces the skins from Robben Island, too. (This island, or rather rock, is situated close to Saghalin Island and does not belong to the Kurile chain as stated by Elliott, p. 8.) Besides, there is a slight typographical error in Elliott's figures, the total being given as 387,462 instead of 389,462.

List of skins of fur-seals slain on Bering Island for shipment:

Years.	Number.	Years.	Number.
1871	4,500	1878	8,674
1872	12,912	1879	13,028
1873	13,040	1880	15,160
1874	13,034	1881	16,078
1875	11,790	1882 to date	18,512
1876	9,822		
1877	6,006	Total, 1871–'82	142,556

I can account for the disagreement in Elliott's list concerning the year 1871 only by supposing that he gives the shipment, while the one above shows how many seals were actually killed every year. The skins taken in the fall are not shipped before the following year.

ENHYDRA LUTRIS (Linn.).

Of this animal I have only to report the sad fact that it has been totally exterminated, or nearly so, on Bering Island. It sometimes happens that a single animal is killed on shore opposite Copper Island, where they still occur in numbers, and I myself was so lucky as to observe a sea-otter swmming along the coast on the same side. It was far off, and my ball missed it; I had, however, a tolerably good opportunity of observing its peculiar manner of swimming by means of a spy glass. The present scarcity of this animal on our island, where it has been so abundant, will be perceived from the fact that since 1871 only ten sea-otters have been captured.

I do not wish to lengthen this already too protracted letter by giving details relating to the blue fox (*Vulpes lagopus* Auct.), and I should perhaps let it pass without mentioning, were it not that Professor Nordenskjöld has published a very erroneous statement, both as to its number and its color. He says (Voy. Vega, Amer. ed., p. 601): "Now they are so scarce that during our stay here we did not see one. Those that still survive, besides, as the European settled on the island informed me, do not wear the precious dark-blue dress formerly common, but the white, which is of little value. On the neighboring Copper Island, however, there are still dark-blue foxes in pretty large numbers," and to this he in a foot-note makes the remark that "it thus appears as if the eager hunting had an influence not only on the number of the animals, but also on their color, the variety in greatest demand becoming also *relatively* less common than before."

That the blue fox, however, is by no means uncommon on Bering Island will be perceived from the fact that a considerable number are killed and sent to San Francisco every year. Thus not less than 1,450 skins were shipped this year (1882), besides 900 from Copper Island. The statement about the color is certainly founded upon a mistake too, for among all the 1,470 skins bought on Bering Island by the Alaska Company in the course of this year only 20 are "white" foxes, so that

it is this latter form which is very rare, both absolutely and *relatively*. Formerly they were more common, but about twenty or twenty-five years ago the old Russian Company resolved to pay more for the white ones than for the blue, and to have them killed all the year round without respect to the season, in order to destroy them and possibly have them exterminated. At present they are very scarce, and now the natives themselves pursue them eagerly, because they spoil the brood by mixing with the blue ones.*

From the following list it will be seen that the number of foxes decreases greatly when they are hunted for several successive years. It has therefore been agreed upon that the hunt be suspended for one or two years, with intervals according to circumstances, in order to give the animals time to fill the diminished ranks. This may perhaps be the cause of Nordenskjöld's mistake. The fact is, that the fox hunting is a very important source of income to the natives on Bering Island.

Number of foxes killed on Bering Island.

Season.	Blue foxes.	White foxes.
1871–'72	836	4
1872–'73	580	28
1873–'74	514	24
1874–'75*	0	0
1875–'76	1,087	50
1876–'77	573	19
1877–'78*	0	0
1878–'79	789	0
1879–'80*	0	0
1880–'81*	0	0
1881–'82	1,447	20
Total	5,826	145

*No foxes hunted during the season in question.

I ought not to omit mentioning two other terrestrial mammals which offer a contribution to the history of the immigration of the fauna. The one is *Mus musculus* L., the other *Arvicola rutilus* Pall.

According to the assertion of the inhabitants, it is beyond any doubt that none of these animals occurred on Bering Island before 1870. Before that time they had not even seen a mouse, and many of them had never heard the name mentioned. In 1880 the "black mouse" (*musculus*) was brought from San Francisco by the schooner "Justus," with a cargo of flour. The "red mouse" (*rutilus*) made its appearance later, but as the natives were then already acquainted with that kind of animal, they did not pay sufficient attention to ascertain in what year the introduction actually took place. That it was introduced later than the common mouse is proved by the belief of the natives, who think that the red, short-tailed mouse is the offspring of the long-tailed, dark-colored animal. It finally turned wild by changing its more domesticated manner of life into the freer habits in the fields and moun-

*On Copper Island white foxes do not appear at all. Besides, the blue ones are said to be larger, which is probably caused by a larger supply of food.

tains. They overlooked the fact, however, that both forms infest their houses and huts in equal numbers.

It is very remarkable how enormously the number of this *Arvicola* has increased since its introduction. For in not more than ten years it has spread all over the island from the utmost point in the north to its southernmost end. Now it is abundant in every locality, in the swamps and among the sand-dunes, on the flats, and in the mountains, in the interior, and everywhere along the beach. All the huts on the island inhabited by the fox-hunters during winter are occupied by them, and they become a veritable annoyance by eating and gnawing everything they can get at. I myself have been greatly troubled by them. My various collections seemed a special attraction to them, and many a nice specimen fell a victim to their destruction. It is almost incredible how they find their way to places thought to be absolutely "mouse-proof."

None of these animals have yet reached Copper Island, but their introduction seems to be only a question of time.

Whether the red field-mouse was introduced by ships or by birds of prey, or in any other way from Kamtschatka, cannot be decided. At all events, the introduction of these two animals took place much against the will of men.

I finally wish to mention the introduction of another terrestrial mammal, which was imported with the intention of having it acclimatized for the use of the natives in the near future. It is the experiment of transferring tame reindeers (*Rangifer tarandus* L.) from Kamtschatka to Bering Island, where the rich pastures seem to justify the hope of success.

Dr. Dybowski and the Alaska Commercial Company share the honor of this enterprise, he by taking the trouble of procuring the animals from the interior of Kamtschatka and taking care of their transportation to Petropaulski; the company, by bearing, with never-failing liberality, the heavy expenses of an undertaking which never can be of any direct benefit to them, but only to the natives of the island.

Four males and eleven females were successfully transferred on board the company's steamer Alexander, where they fed on the fresh leaves of birch and willow procured in Petropaulski, much against the predictions of experts. After the leaves were consumed, they even put up with hay, and were safely landed at Bering Island on the 15th of July, 1882. On shore they eagerly began to graze the fresh herbs, but within half an hour the whole herd was *en route* southward for the mountains. All fifteen have been seen very lately. The natives complain that they have eaten all the cloud berries (*Rubus chamæmorus*) and crake berries (*Empetrum nigrum*) in the neighborhood of the Southern Rookery, a trifle, however, compared with the self-evident utility of the animal.

LEONARD STEJNEGER.

BERING ISLAND, *September* 30, 1882.